

FISSURE OF THE SOFT AND HARD PALATE.

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IN April, 1843, I published in the *New England Quarterly Journal of Medicine and Surgery*, an account of a new operation for the closure of fissures in the hard palate, together with a very important modification of the operation of staphyloraphy as practised for the relief of fissures of the soft palate. The operation upon the hard palate (I quote from the description of my first case as reported at that time) consisted in "dissecting up, with a long, double-edged knife, curved on its flat side, the membrane covering the hard palate, pursuing the dissection quite back to the root of the alveolar processes. By this procedure, which was not effected without considerable difficulty, the membrane seemed gradually to unfold itself, and could be easily drawn across the very wide fissure. A narrow slip was now removed from the edges of the soft palate, and with it the two halves of the uvula. By this means a continuous flap was obtained, beginning at the roots of the [incisor] teeth, and extending backwards to the edge of the velum palati. Finally, six sutures were introduced, on tying of which the whole fissure was obliterated. * * * * This patient returned home into the country at the end of three weeks, a firm, fleshy palate being formed behind, and half the fissure in the bony palate obliterated. In the following spring, I again operated on the remaining fissure in the hard palate, and succeeded in closing half the extent of it, the tissues yielding with some difficulty, owing to the inflammation caused by the former operation. The small aperture which remained, I directed to be closed by a gold plate." I had at this time operated in this manner in fourteen different cases, "which, with one exception, had terminated successfully, either in the closure of the whole fissure of both hard and soft palate, or so far that the aperture which remained in the bones could be easily closed by an obturator fitted to the adjoining teeth."

The improvement to which I have alluded in the operation upon

the soft palate, consisted in the relaxation of the tissues of the fissured velum by means of incisions, made with strong curved scissors, so as to divide the attachments of the soft palate to the tonsil and to the posterior pillar, or, in other words, dividing the posterior pillar of the palate just where it begins to spread out into the velum. The effect of this incision is at once seen in the almost complete relaxation of the parts, so as to admit of their easy approximation and union by suture. At this time I had met with no case in which this procedure failed to relax the parts, as I thought, sufficiently for the requirements of the operation, and in the fourteen cases of operation for complicated cleft palate which I had then performed, I had met with but one unsuccessful result. In subsequent operations, however, I found that there existed, in some cases, an additional obstacle to the approximation of the flaps, which could be overcome as easily and in the same manner as the former. This obstacle consists of a band of firm tissue extending above and behind the soft palate, and standing out in bold relief when that organ is put on the stretch by drawing upon it with the forceps. This resisting mass, like the other, I have always divided by an additional stroke or two with the scissors whenever the incision of the posterior pillar and adjacent mucous membrane has seemed insufficient properly to relax the palate. By this division of all the parts which oppose any active resistance to the approximation of the sides of the fissure, the operation, as I have performed it, was finally perfected in its essential features; and since that time I have known of no important improvements in it except in a few matters of operative detail. During the past few years, however, I have generally abstained from the attempt to effect the entire closure of very extensive fissures in the hard palate, owing in part to the severity of the operation, but chiefly to the fact that modern improvements in mechanical dentistry have furnished us with a most efficient and comfortable substitute for the natural hard palate, in the form of a metallic or hard rubber plate.

To complete the history of the operation as originally performed by me, I will again quote from the same paper the description of the method of operating.

Operation.—"The patient is placed on a low seat, in a strong light, his head firmly supported on the breast of an assistant, who raises or depresses it, as circumstances may require. He is directed to keep the jaws widely separated, to retain any blood which may

collect as long as possible, so as not to embarrass the operator, and to restrain all efforts at coughing. To do this will require constant warnings and encouragement on the part of the surgeon, as there is a natural tendency to close the mouth as soon as any pain is felt, or there arises any collection of blood or mucus in the fauces which interferes with respiration. The use of a speculum, as directed by some operators, is altogether inadmissible; it not only obscures the light, but also prevents the proper manœuvres of the instruments. The mucous membrane of the hard palate is now to be carefully separated from the bones with a long double-edged bistoury, curved on its flat side, and is rather *peeled* than dissected off, from the difficulty of making any sawing motion with the knife in this confined situation, the obstacles always being greater in proportion to the obliquity of the palatine vault. As the dissection approaches to the connection of the soft parts with the edges of the ossa palati, where the muscles are attached and the union most intimate, great care must be taken or the mucous membrane will be perforated. From these causes, I have found this part of the operation to be the most embarrassing. As soon as this dissection is terminated, it will generally be found that, by seizing the soft palate with the forceps, it can be easily brought to the median line. If the fissure is wide, and this cannot be effected, I have found the following course to be invariably followed by success. The soft parts being forcibly stretched, a pair of long, powerful, French scissors, curved on the flat side, are carried behind the anterior pillars of the palate; its attachments [that is, the attachments of the palate] to the tonsil and to the posterior pillar are now to be carefully cut away, on which the anterior soft parts will at once be found to expand, and an ample flap be provided for all desirable purposes.¹ The edges of the palate may now be made into a raw surface by seizing them upon either side with a hooked forceps, and removing a slip with the scissors or a sharp-pointed bistoury. Our next object is to insert the ligatures, and for this purpose an immense armory of instruments has been invented. After the trial of nearly all of them, I have found the most simple to be the most effectual. A small curved needle being armed with a strong silk thread, confined in a forceps with a movable slide, is introduced to the upper edge of the fissure, the needle being carried

¹ In Mr. Fergusson's elaborate essay on cleft palate, in vol. xxiii. of the Medico-Chirurgical Transactions, the description of this stage of the operation is incorrectly quoted, so as to give an entirely erroneous idea of the nature of the incisions.

from before backwards on the left side, and from behind forwards on the right, or *vice versa*. In this manner, three, four, or more ligatures may be successively introduced. The patient is now requested to clear his throat of mucus and blood, the ligatures are wiped dry and waxed, and tied with deliberation, beginning at the upper and proceeding gradually downwards, waiting a little after each ligature, in order to allow the throat to accommodate itself to this sudden and almost insupportable tension of the soft parts. No forceps are required for holding the first knot while the second is tied; the object is better effected by using the surgeon's knot—that is, by making two turns of the thread instead of one—and by enjoining perfect quiet on the patient for the moment, until the second knot is tied. It has been advised by some surgeons to wait a certain length of time, after the cutting part of the operation, before inserting the ligatures—five or six hours, for instance—to allow all bleeding from the wound to cease. This appears to me a useless prolonging of the patient's suffering, and entirely unnecessary. I have never seen, in a single instance, either in the operations of surgeons abroad, or in my own experience, any hemorrhage that a little iced water, or the pressure for a short period with the finger, would not easily arrest.”¹

By the introduction of these improvements in the plan and methods of operating, the surgery of cleft palate at once acquired a new and vastly-enlarged importance. The operation of staphyloraphy, as invented by Roux, and practised by many surgeons both in Europe and America, had been considered applicable only to simple fissures of the velum, a class of cases constituting but a very small fraction of the total number of cleft palates, and the very ones in which the need of surgical aid is least urgent.²

The highly successful results, however, which I was enabled to

¹ New England Quarterly Journal of Medicine and Surgery, Boston, April, 1843, vol. i. pp. 538-47.

² It is true that Roux had occasionally operated to close the posterior extremity of the more extensive fissures by cutting away the velum from the *ossa palati*, thus leaving the wide fissure in the bones wholly unrelieved; and Krimer had once transplanted flaps of inverted mucous membrane to fill the hole left after an operation for staphyloraphy. Still these plans did not prove to be of sufficient value to lead to their general adoption, and the severer forms of cleft palate, comprising the great majority of actual cases, were uniformly left untreated, as being too unpromising to justify operative interference. The few attempts, whether successful or otherwise, which had previously been made to close openings caused by wounds, or by syphilitic or other disease of the hard palate, are certainly not to be included in the same category with operations for congenital cleft palate.

report in the treatment of cases which had previously been considered as beyond the aid of surgery, together with the encouraging success which had been already attained by Roux, Dieffenbach, and many other surgeons, from the operation in the soft palate, soon excited the renewed interest of the profession in this most distressing deformity.

An important improvement in the original operation of Roux had been already introduced by Professor Dieffenbach, of Berlin. It consisted in relieving the often dangerous tension upon the stitches by means of deep linear incisions, one on each side of and parallel with the line of suture, and about half an inch distant from it, thereby completely transfixing and dividing all the layers of the soft palate. These incisions immediately gape so as to take the form of oval clefts, and the tightly-strained velum becomes loose and flaccid, "like a wet curtain."¹

Professor Pancoast, of Philadelphia, had also adopted the same incisions in a case upon which he had operated at the Philadelphia Hospital in February, 1841, "in order to enable the two halves of the velum to come together in the middle line, as well as to divide the insertion of the palate muscles, so as to prevent their straining the sutured edges of the palate asunder."² This method has also been adopted by Mr. Pollock, of London, and by Professor Sédillot, of Strasburg, who have shown that the levator palati muscle may be thus divided by a cut of less than half an inch in length. In this way the gaping of the incisions, which is described as taking place in the operation as performed by Dieffenbach, may be almost wholly prevented, although no particular inconvenience seems to result from its occurrence.³

Shortly after the publication of my paper, Mr. Fergusson, the distinguished professor of surgery in King's College, London, took up the study of the anatomy and pathology of cleft palate, the results of which are contained in a most elaborate and exhaustive essay, read before the Medico-Chirurgical Society in December,

¹ For a translation from Dieffenbach's *Operative Chirurgie* containing his description of this operation, see the *Dublin Journal of Medical Science* for November, 1845.

² Extract from a paper on Staphyloraphy, by Professor Pancoast, in the *American Journal of the Medical Sciences* for July, 1843.

³ For a description of this method of dividing the muscles of the velum, see Professor Sédillot's *Traité de Médecine Opératoire*, or Mr. Erichsen's *Science and Art of Surgery*.

1844, and published in volume xxiii. of its Transactions. In this important paper, Mr. Fergusson has given an admirable account of the dissection of a specimen of cleft palate, which he was fortunate enough to procure from a dissecting-room subject, and adds a masterly analysis of the individual action of the various muscles of the palate in opposing the approximation of the edges of the fissure. He concludes by advocating the formal section of two of the four pairs of palatine muscles, viz., the levatores palati, and palatopharyngei, as being the organs chiefly concerned in the separation of the flaps. The former of these muscles he divides with a slender curved knife, according to a plan original with himself, at a point somewhat higher than in my procedure with the scissors, and still further from the place of the lateral incisions of Dieffenbach. For the division of the palato-pharyngei muscles he snips the posterior pillars of the palate with strong curved scissors in precisely the same manner which I had already described, although it would appear from a slight typographical error in his quotation from my paper, that he did not fully comprehend this part of my description. At this date Mr. Fergusson had operated twice with success; in one of these cases, where the fissure extended a quarter of an inch between the palate bones, he had tried the plan of dissecting up the soft parts from the bones, but with only partial success, owing, perhaps, to the insufficient extent of his incisions. In 1846,¹ he had not yet succeeded in closing any fissures in the hard palate, although still disposed to give the operation further trials. At this date he had operated eight times for fissures of the soft palate, in six of which he was successful. In 1849² he had still had but little success in his operations upon the hard palate, but was able to report that of twenty-four cases of staphyloraphy, it had proved of advantage in twenty-one. The latest record which I have seen of Mr. Fergusson's experience is contained in one of a course of lectures delivered last year before the Royal College of Surgeons of London.³ In this lecture he states that he has operated upon a hundred and thirty-four cases, with only five failures, which enumeration includes, however, "all kinds of cases, and refers chiefly to the cleft in the soft palate." He still prefers to divide the levatores palati muscles according to his original plan, although he

¹ See his *System of Practical Surgery*, 2d edition.

² See *London Journal of Medicine* for January and February, 1849.

³ *Lectures on the Progress of Anatomy and Surgery during the present Century*. Reported in the *Lancet* and in the *Medical Times and Gazette* for 1864.

admits the success which has been attained by other surgeons who have adopted the earlier device of deep lateral incisions through the velum. It would appear, however, from some of his published papers that he now makes the incisions above and behind the palate much more extensive than at first, and in that way may sometimes divide the greater part of the muscular layers of the velum, and so dispense with snipping across the posterior pillar.¹

The subject of cleft palate has been still further illustrated by several British surgeons of distinction, among whom Messrs. Avery and Pollock, of London; Mr. Collis, of Dublin, and Mr. Field, of Brighton, are especially prominent. All these gentlemen have operated with the most perfect success upon fissures as well of the hard as of the soft palate, and they have all adopted my plan of separating the soft textures freely from the palatine arch.² Mr. Pollock, as has been already stated, divides the palate muscles by a partially submucous incision, at a point near the hamular processes, where the fibres begin to spread out into the velum.

Since the late important researches of M. Ollier, of Lyon, upon the agency of the periosteum in the regeneration of bone, the principles which he has made known have been applied to a very great variety of surgical operations. Following out these analogies, Professor Langenbeck, the accomplished teacher of clinical surgery in the University of Berlin, has proposed to apply the same principle to the operation for cleft palate.³ Starting with the entirely erroneous assumption that previously to the year 1862, but a single trustworthy case had been reported of a completely successful operation for the closure of a congenital fissure of the hard palate—and that, the often quoted experiment by Krimer of the transplantation of inverted flaps of mucous membrane—he sought to explain the supposed want of success by the rather plausible theory that all previous operators had erred by dissecting up the mucous membrane only, and thus had formed flaps of such excessive tenuity as to preclude their proper nutrition. He, therefore, insists upon the

¹ Compare the description of this part of the operation as given in the paper in the London Journal of Medicine for 1849, and in the Lectures on the Progress of Anatomy and Surgery in 1864.

² Messrs. Pollock and Field have expressed themselves somewhat decidedly in favor of operating upon a part only of the fissure at a time, but Mr. Collis, who was at first of the same opinion, has lately given the preference to my original plan of completing the whole operation at a single sitting.

³ Archiv für Klinische Chirurgie herausgegeben von Dr. B. Langenbeck, 2ter Band. Berlin, 1862.

careful separation, from the bony vault, of the whole thickness of soft textures, taking especial pains to include the periosteum. The publication of these views, thus claimed as novel, immediately called forth statements from Messrs. Pollock and Field, and afterwards from Messrs. Fergusson and Collis, who all assure us that it was always their practice to dissect the membrane as cleanly as possible from the bone, as, indeed, must almost necessarily be the case, owing to the thinness of the layer, the intimate union of its different portions, and, more than all, the comparative looseness of its attachments to the bones.¹ Professor Langenbeck's method of separating the muco-periosteum from the bones scarcely differs from that employed by other operators, except that he uses blunt-edged, pointed instruments instead of knives; but he insists upon the necessity of making long lateral incisions through the coverings of the palate along the roots of the alveolar processes, and just in the course of the posterior palatine arteries, a proceeding which, as he informs us, is attended with pretty active bleeding. As a means of facilitating the separation of the membranes from the bones, in cases of extreme obliquity of the sides of the fissure, these lateral incisions may sometimes prove of great convenience, but I have seen very few cases in which they could have rendered any service in relaxing the flaps. In the course of an operation for the closure of an old syphilitic perforation of the hard palate I have known a most troublesome and persistent hemorrhage to occur from an incision in precisely the same situation as those recommended by Professor Langenbeck.

I propose now briefly to describe the different stages of the operation as I have lately performed it, comparing some of the methods which I employ, with those suggested by other surgeons.

1. *The Separation of the Palatine Membranes from the Bones.*—This procedure I have found necessary in fully nine-tenths of the cases upon which it has been my lot to operate. A large proportion of the fissures which at first sight seem confined to the soft palate, really extend a little way between the palatine bones; and even among those which apparently extend only to the margin of the bony vault, the top of the fissure is often of a rounded rather

¹ For references to thirteen published cases of successful operations for congenital fissure of both soft and hard palate, see the last pages of this paper. In all the thirteen cases there was perfect restoration of the velum with important diminution in the size of the fissure in the bones. In seven of the thirteen cases the complete closure of the cleft was effected.

than an angular form, so as to render it difficult or impossible to bring the flaps together at this part without first loosening their attachments. By adopting this measure, however, the upper sutures are applied as easily as the lower ones, and the danger of partial failure at this particular part of the palate, formerly so common, is almost wholly obviated. In cases of more extensive fissure of the hard palate this separation is to be carried further, in some instances even to the alveolar processes. I have always completed the operation, as far as I have thought it proper to attempt it at all, at a single sitting, because in this way we are almost certain to obtain good union of the velum, and a partial closure, *par glissement*, of at least the posterior portion of the fissure in the bones. The closure of the anterior portion of extensive fissures of the hard palate is always a matter of considerable difficulty and uncertainty, and is, besides, of very little importance in comparison with the formation of a good septum between the mouth and nostrils behind. Whenever, by the re-establishment of the velum and of the posterior part of the palatine vault, we have succeeded in reducing the fissure to a simple foramen in the hard roof of the mouth, we have practically relieved the patient from his disgusting and distressing deformity, for he only needs a light metallic or vulcanite plate, such as is now worn by every one who has a set of false teeth, to enable him to articulate as well as if the aperture were closed by the natural bone and membranes. Led by these considerations, and by the desire to shorten as much as possible an operation which must almost necessarily be performed without the aid of anæsthesia, I have ceased, of late years, to operate for the closure of the anterior portion of the cleft in extreme cases, and this notwithstanding the fact that in my earlier years of practice I succeeded in completely closing a very large proportion of all the fissures upon which I operated, including some very extensive ones, and thus established the operation as a perfectly practicable one. In commencing this part of the operation, I have always used a knife substantially like that which I first employed, viz., a double-edged, spear-pointed knife, strongly curved on its flat side; which I have found to answer well for almost all fissures of moderate extent, although in some extreme cases, in which the bones have deviated widely from their normal curvature, very considerable difficulty has been experienced in making the first incisions at the edges of the fissure. In these cases there is often no proper roof to the mouth, owing to the extreme obliquity of

the bones, which rise, as it were, almost vertically from the alveolar margins towards the nostrils. To facilitate these first incisions in such cases, it has been proposed by Dr. Smyly to commence the dissection with a slender knife, shaped somewhat like an ordinary gum lancet, and used through the nostril, where the edge of the fissure may be more readily reached than from the mouth. Sharply re-curved knives, worked from the mouth, have also been used for the same class of cases; and a particularly ingenious one has been invented by Mr. Pollock, in which a short chisel-shaped blade is attached to a metallic stem by means of a hinge, and is fitted with a screw movement by which it may be adjusted to any required angle. Both these contrivances have been tried and approved by Mr. Collis, and are doubtless of great utility in the cases for which they are designed. This commencement of the dissection at the edges of the fissure is by far the most difficult part of the operation, for it is at this part of the palate that the membranes are always found most firmly adherent to the bones. As we proceed, however, the separation becomes very much easier, and the membranes seem almost to peel off from the bones; I have therefore, at this point, generally abandoned the knife, and have continued the dissection, as far as I have thought necessary towards the alveolar processes, by means of curved scissors. In this way I have been sure of preserving the greatest possible thickness of tissues in the flaps without endangering their nutrition by the division of the palatine arteries. In most of the cases which I have seen there has been little or no deficiency of materials to fill the gap, but the fissure has been the result rather of the oblique direction of the ununited sides of the palatine vault. The operation consists, then, not so much in stretching the flaps tightly across the cleft, as in bringing them into a more nearly horizontal position. I have not, therefore, seen that much benefit is to be expected from lateral incisions through the palatine membranes, and have always abstained from making them, from the fear of causing needless and troublesome hemorrhage, and thus unnecessarily prolonging an already too tedious operation. At the posterior edges of the ossa palati the union between the soft parts and the bone is very intimate, owing to the insertion there of the tendinous fibres of the velum, and more particularly of the reflected tendons of the *tensor palati* muscles. For completing the separation at this point, I use a pair of probe-pointed scissors, which I have found to divide the firm tissues much more conveniently and expeditiously than any knife

In all the operations which I have performed, I have met with but a single case of troublesome hemorrhage, notwithstanding the very free dissection of the coverings of the hard palate, a result which I am inclined to attribute to the peculiar manner in which the posterior palatine arteries are protected by the bony channels sunk for them at the sides of the hard palatine vault. At the moment of freeing the flaps from their attachments to the posterior margins of the palate bones, a few arterial twigs are generally divided, but I have always been able to control the bleeding by the use of iced water. In a single instance, however, in which the upper stitch was unusually tense, the bleeding continued after the adjustment of the sutures, but immediately ceased when the stitch was divided so as to allow the membrane to apply itself more closely to the bone.

2. *The Relaxation of the Two Halves of the Velum by the Division of Resisting Bands of Muscle and Mucous Membrane.*—This has been a most important feature in all my operations, and is still performed in the same manner as in my earliest cases. The instrument employed is a pair of large and strong French scissors, curved on the flat side. One of the halves of the split uvula is seized with appropriate forceps, and drawn across the fissure. This brings out in bold relief two strongly resisting bands, one below and one above the palate. The former, consisting of the posterior pillar of the palate, is then divided by a powerful stroke of the scissors, and the incision extended forwards and backwards, dividing as much of the mucous membrane as may be necessary to relieve all tension at this part. The other band, consisting chiefly, as Mr. Fergusson has shown, of the levator palati muscle, with its mucous coverings, is next divided in the same manner as the posterior pillar, including, as before, in the incisions, a greater or less extent of the adjacent mucous membrane, as may seem to be requisite to effect the perfect relaxation of the organ. The completion of this stage of the operation is shown by the striking change in the condition of the half of the velum, which, from a state of violent spasmodic contraction, burying itself, as it were, in the side of the throat, becomes perfectly flaccid and powerless. As soon as this result is attained, this part of the operation is to be considered as finished, whether the incisions have been more or less extensive; in some cases a comparatively slight snip of one or both muscular bands seems to suffice, while in others new resisting folds of mucous membrane come out, one after another, requiring successive division. By this method no part is divided until it has been first

brought into a state of tension, and thus shown to require it, and there is no uncertain groping in the dark with knives applied to hidden muscles in a state of partial relaxation. For facility and certainty of execution, dividing no more and no less than is required, and for absolute freedom from danger, it seems to me that this method of relaxing the soft parts has never been surpassed. That other plans may be useful, I have no doubt; but whether they offer advantages equal to the present, can be settled only by a series of comparative trials in practice, such as have not yet been made.

3. *The Paring of the Edges of the Fissure.*—This is performed sometimes with scissors and sometimes with a slender, pointed knife, and I am not aware that there is any decided preference to be given to either method. The edge of the flap is made tense by drawing upon the uvula with a pair of strong but slender-toothed forceps, which I have devised for the purpose, and which are described in the *American Journal of the Medical Sciences* for January, 1853. These forceps, of which two pairs are required for the two sides, are made with a double curve, and are so contrived as to seize the extreme edge of the palate without encroaching more upon one surface than the other. The same forceps are employed also in the preceding stage of the operation to put the palate on the stretch, and, as a general rule, after once seizing the organ, I do not let it go again until I have pared its edge. I have not found it desirable to attempt to preserve the whole uvula, for it generally hangs so low in the throat as to cause irritation, and thus interfere with the success of the operation. In most cases, therefore, I remove the greater portion of the two halves of this appendage at the time of paring the edges of the palate.

4. *The Application and Adjustment of the Sutures.*—In the early days of staphyloraphy this was by far the most difficult and vexatious part of the operation, owing to the extreme irritability of the parts provoking violent muscular retraction whenever the flaps were pricked by the needle. After adopting the plan described for the relaxation of the organ, I observed that this stage of the operation was immensely facilitated, so that for a number of years I was in the habit of passing the sutures with a small curved needle held by forceps. Increased experience has, however, demonstrated the usefulness, in many cases, of the ingenious *crochet-aiguille* of Schwerdt, a sharply re-curved needle, mounted in a handle, and having an eye at its point which can be opened and

closed by a slight pressure upon a spring. The instrument is threaded, and passed through the edge of one of the flaps from behind forwards, and one end of the thread drawn through by catching the loop with a tenaculum or hook. The needle, still threaded, is then withdrawn, and carried through the flap on the opposite side; the eye is then opened, and the thread wholly disengaged from it by drawing upon the loop. I have generally adjusted the middle suture first, by that means controlling the palate, and thus rendering the insertion of the others easier. The lower one is best inserted last. At the lower part of the palate, where the parts are very movable, I have found it difficult to fix them with this instrument, and therefore prefer to use a delicate curved needle held in a *porte-aiguille*. The chief objection to the needle of Schwerdt is the difficulty of keeping it sharp, owing to its being split at the point. Very broad sutures, made of a number of waxed threads arranged in the form of a flat band or tape, have been much employed in France, and Dieffenbach used to insist strongly upon the advantage of using wires of soft lead. I have always used a single thread of common, surgeon's silk, thoroughly waxed, and tied with the ordinary surgeon's knot. I have lately been in the habit of preparing the silk by soaking it a day or two beforehand in the compound tincture of benzoin, by which it acquires an adhesive property, and is less apt to slip when the knots are tied.¹ The sutures should not be drawn so tightly as to strangle the parts between them, or they will cause irritation and swelling. On the other hand, it is important to bring the opposite edges of the fissure into absolute contact with each other without much tension, or the stitches will as certainly cut their way out, and thus defeat the end for which they are employed. In an interesting case of operation for the closure of a very extensive fissure of the hard palate, performed by Mr. Collis, and reported in the *Dublin Quarterly Journal of Medical Science* for February, 1865, the flaps, although of ample breadth, tended obstinately to revert to their original position in contact with the bones, and thus caused injurious tension upon the stitches. This was overcome by the very happy and ingenious expedient of pushing the flaps, as it were, towards the median line, by means of wedges of sponge introduced between them and the bones; these were easily removed

¹ I owe this valuable suggestion to my friend and former pupil, Dr. Calvin G. Page, of this city.

through the nostril after forty-eight hours, and the result was a nearly complete and most satisfactory union.

5. *The After-Treatment.*—This was formerly the severest and most vexatious part of the management of the case, owing to the supposed necessity of interdicting all use of the parts in swallowing for several days following the operation. Thus Roux enjoined complete abstinence from food and drink for five days, believing that the mere act of swallowing the saliva would disturb the ligatures and prevent union. In my first cases I also followed the same plan, nourishing the patients for several days solely by enemata. The obviously unfavorable effect of thus starving a person in full health, and accustomed to a generous diet, led Sir Philip Crampton, of Dublin, to try the experiment of allowing his patients an ample supply of soft food, such as boiled bread and milk, custard, soup, jelly, etc., during the whole period of the treatment. The publication, in January, 1843, of the two cases in which this plan had been successfully tried, was immediately followed by the abandonment of the old and most irksome restriction, and patients are now allowed as much liquid or semi-solid food as they desire. Much trouble is often experienced after the first three or four days from the secretion of tough adhesive mucus in and around the line of suture, which gives rise to an irritating cough of such severity as sometimes to threaten the destruction of the newly-formed adhesions. In this condition of the parts I have often seen much benefit from the use of warm or acid drinks, or from brushing the parts with a weak solution of nitrate of silver.

At first I was disposed to begin to remove the sutures at the earliest possible period, but latterly, from having once had all the adhesions give way during the act of withdrawing the threads, I have allowed them to remain a very long time. It is rather important that the mouth should not be too widely opened during the early stages of the adhesive process. Once, on the fifth or sixth day, I have known the entire wound to give way from the patient opening the mouth too widely for the purpose of inspection.

The number of cases of cleft palate upon which I have operated by these methods, is now between ninety and a hundred; of this number, in less than one-tenth was the fissure confined wholly to the soft parts, and in at least three quarters, the gap extended into or through the maxillary portion of the palatine vault. In not more than nine or ten cases, therefore, have I found it practicable to close the fissure without first dissecting up the membranes from

the posterior part of the hard palate, and cutting through the tendinous attachments of the velum to the ossa palati. I have in no case been deterred from operating by the extent of the deformity, and in several cases, of most formidable aspect, I have succeeded in improving the voice, and facilitating deglutition, as completely as in even the simplest fissures of the velum. In one case of simple fissure of the soft palate, occurring some two years since, in a very young patient, I was tempted to operate without first dividing the muscles. The edges of the fissure came so easily together that any farther incisions seemed unnecessary; and for several days after the operation everything looked fair. On the whole, it was the easiest and most promising case I had had for several years. About the seventh day, however, the adhesions gave way, owing, as I believe, in part, at least, to the imperfect method adopted. As to the proper age at which to operate—in one case of a fissure which extended but little more than through the uvula, I operated on a child of between six and seven years; but generally it is necessary to wait until the patient is old enough fully to appreciate the importance of the operation, and to submit patiently to pain and inconvenience, for this is one of the very few operations in which the use of anaesthetics is inadmissible. Under very peculiar circumstances, I suppose, ether might be administered, but not without some risk to the patient, and much embarrassment to the surgeon, from the constant flow of blood down the throat.

The result of these operations may be stated briefly as follows. With the exception of perhaps half a dozen cases, I have never failed to get more or less union of the soft palate. Sometimes one, or more rarely two, of the sutures have given way at the upper part where the tissues are put most fully on the stretch. If any of the stitches hold, however, and the smallest union takes place, it may be afterwards extended either by the renewal of the sutures, which is now a comparatively easy matter, or by the application, at considerable intervals, of the solid nitrate of silver to the angle of the remaining fissure. The great point is to establish the arch of the soft palate as completely as possible, and when this is once accomplished, any aperture which may remain in the hard palate can be effectually closed by simple mechanical means. In cases of extreme fissure extending through the alveolar arch, where a few artificial teeth are almost always required to fill the gap caused by the lost or distorted incisors, the plate upon which the new teeth are mounted serves also to close the remaining cleft in the

roof of the mouth. In such cases, therefore, there is but little inducement for the surgeon to undertake, or for the patient to endure, a tedious dissection for the closure of an aperture in a part which must after all be covered by a plate. Of course, in all cases, the more completely the fissure can be closed by the operation, the better it is, but what I wish particularly to enforce, is the fact that even in the most extreme cases of very wide fissure in the bones, an operation can be performed which is as effectual in restoring the voice, and almost as easy of execution, as in cases of the simplest character, and confined to the velum or extreme back part of the palatine vault.

The question is often asked of the surgeon whether the voice will be immediately restored by the operation, and if not, in what time the full restoration may be expected. The answer must, of course, be very indefinite, for, in fact, the patient has now to learn, for the first time, the art of using the palate in articulation. Almost every patient, after the opening is entirely closed, experiences a sense of relief, which is owing both to the greater ease with which deglutition is performed, and also to the protection afforded by the new palate to the mucous membrane of the posterior fauces, which, before the operation, was dry and parched from the constant passage of the air over it. I have lately had occasion to see several patients two or three years after the operation. Two of them are teachers in public institutions, and the only defect to be perceived is a slight huskiness of the voice, which would hardly be noticed by any one ignorant of their former condition. I do not remember to have seen a case in which the patient was not materially benefited.

The following cases have been placed on record from time to time, not, however, from the wish to present full notes even of the more important among them, but rather to indicate the results of accumulating experience as influencing my estimate of the value of the operation, and my practice in the execution of its several details.

In my original paper, which was published in the *New England Quarterly Journal of Medicine and Surgery* for April, 1843, I gave the results of three cases only in detail, but stated that out of fourteen operations for fissure of both soft and hard palate, I had in all but one instance succeeded in effecting the union of the fissured velum, and had, besides, either entirely closed the cleft in the bones, or had so far diminished its size as to admit of its easy

and perfect closure by a plate fitted to the adjoining teeth. The following is a concise summary of the three cases then reported, for the original account of which I refer to the paper just cited:—

CASE I.—This is the first case upon which I operated, and the operation and its results have already been given at length at the beginning of this paper. The patient was a young man, 25 years of age, with congenital fissure of the velum and left side of the hard palate, extending as far forward as the anterior palatine foramen. The immediate result of the operation was the re-establishment of the arch of the soft palate, together with the closure of the posterior half of the fissure in the bones. A second operation, several months after the first, effected the closure of half of the remaining fissure, leaving an aperture through the roof of the mouth of only one-quarter the size of the original cleft in the bones. The hole was covered by a gold plate. There was great improvement of the voice.

CASE II.—A woman, 35 years old. Fissure of velum, and extremely wide cleft in left side of hard palate and alveolar arch, with harelip. Teeth separated nearly an inch in front. Operation, June 23, 1841, on hard and soft palate and harelip, all at one sitting. *Result*: Perfect union throughout in seven days, with immediate and very great improvement in the voice.

CASE III.—Congenital fissure of soft and hard palate, with cleft in the bone three-quarters of an inch in width. Operation in December, 1842. *Result*: Perfect adhesion and removal of sutures in forty-eight hours. A small aperture at the upper angle was obliterated in a fortnight by the use of caustic.

In the fourteen cases upon which I had operated at the date of this paper, I had followed the practice laid down by Roux, of confining the patients to bed, and enjoining entire abstinence from food and drink during four or five days following the operation.

During the three years next succeeding this publication, I continued to operate upon the same class of cases in the same manner and with the same success as before. I had, however, been led by the researches of Mr. Fergusson to reflect more particularly than before upon the effect of my incisions in the sides of the throat in dividing the fibres of certain of the palatine muscles, and had repeated, with marked success, Sir Philip Crampton's experiment of feeding the patient during the whole course of the after-treatment. In April, 1846, I commenced to record a second series of cases, which, to the number of ten, were published in the *American*

Journal of the Medical Sciences for April, 1848. The following is a short *résumé* of them:—

CASE I.—Congenital fissure of soft and hard palate, with harelip. The lip had been operated on in infancy, with the usual effect of narrowing the cleft in the alveolar arch. Speech scarcely intelligible. Operation April 4, 1846; six sutures were used. *Result*: Good union of velum, but failure in the hard palate, owing to the occurrence of hemorrhage and the consequent formation of coagula forcing the flaps apart. (This is the only case in which I have had trouble from this cause.)

CASE II.—Congenital fissure of hard and soft palate, with an excessively wide gap in the bones. A most unpromising case. Operation in April, 1846; five sutures. *Result*: Perfect union of velum, with obliteration of about two-thirds of the whole fissure. Obturator fitted. Speech very much improved.

CASE III.—Congenital fissure of soft and hard palate, the latter half an inch in width. Operation Sept. 26, 1846; four sutures. *Result*: A very small aperture remained at the upper angle of the fissure, which healed in a little more than a month, after being touched a few times with nitrate of silver. Voice greatly improved.

CASE IV.—Congenital fissure of velum and of hard palate through the ossa palati. Operation Oct. 8, 1846. After three days the wound seemed about to suppurate, and the sutures threatened to give way. An additional suture was applied at the lower part of the fissure. *Result*: Partial union, which was afterwards completed by the occasional use of caustic and scarifications. New velum quite flexible, and speech much improved. (The trouble in this case was afterwards traced to the accidental use of a new sponge containing sand.)

CASE V.—Congenital fissure of soft and hard palate, extending two-thirds of an inch into bones, and of about the same breadth. Operation Oct. 13, 1846; five sutures. *Result*: Velum well united. A small opening remained at upper angle of fissure, which was closed after a few months by the use of caustics.

CASE VI.—Congenital fissure of the palate, with division of the bones. Operation Dec. 16, 1846; six sutures. Severe vomiting occurred on the second day, but without material damage to the new adhesions. *Result*: Complete union, except a minute hole at apex of fissure, which closed of itself in less than two months.

CASE VII.—Congenital fissure of palate, extending an inch into the bones; this portion of fissure of unusual width. Operation

March 31, 1847; five sutures. Two stitches removed on the third day, the rest on the fourth; fissure seemed closed in whole extent. On the fifth day he very heedlessly ate hard biscuit and cake, by which he burst open the upper part of the fissure; the velum remained united. The remaining opening in the hard palate was closed in about half its extent by a second operation in the June following. *Result*: A small opening remained through the hard palate at the apex of the original fissure.

CASE VIII. was similar to the last; bones widely separated. Operation May 31, 1847; four sutures. *Result*: Soft palate united; small fissure remaining in bones.

CASE IX.—Congenital fissure of soft and hard palate, extending through nearly one-half of the bony vault. The fissure in the hard palate was very narrow, and with remarkably shelving sides, so as to render it extremely difficult to separate the membranes at the edges of the cleft; with patience, however, this was finally accomplished. Operation July 13, 1847. Three days afterwards the stitches were removed, and the whole extent of the fissure seemed to be closed. *Result*: Perfect union, except a small aperture at the upper angle, which was, however, obliterated by the use, first of lunar caustic, and afterwards of strong tincture of cantharides.

CASE X.—Congenital fissure of the soft and hard palate, with double harelip. Patient twenty years of age. By an operation performed on the lip six years before, the intermaxillary bone had been almost wholly removed; as is usual after this operation, the maxillary bones had been dragged into contact with each other in front. The palatine processes of the maxillary and palatine bones seemed almost wanting, and the whole arch was very narrow. Operation. From the extreme deficiency in the bony vault, the membranes could not be made to come together across the gap. The velum, however, united. After a fortnight, finding that the coverings of the hard palate had become very much thickened, I again dissected them up, and this time was able to unite the flaps by suture. *Result*: Partial closure of the gap left after the first operation, with a thickened, fleshy state of its edges, which seemed to promise a still further diminution in its size, or possibly even its entire obliteration. This remaining hole, which was quite small, was closed by two bits of elastic vulcanized India rubber stitched together in the form of a shirt-stud. A plastic operation was after-

wards performed upon the lip and nose, with the effect of very greatly improving the appearance of the patient.

In all the ten cases of this series the patients were allowed to take liquid nourishment freely, and, for the most part, to sit up and go about the house. In none of them was there any constitutional disturbance or any severe inflammatory action.

On the 13th of September, 1852, and again July 11th, 1853, I made a few verbal statements upon cleft palate to the Boston Society for Medical Improvement, which were afterwards printed in the Secretary's report in the *American Journal of the Medical Sciences* for January and October, 1853. On these two occasions I alluded to nine operations which I had performed within a short time, but which I did not report in full. The object of these few remarks was—1st, to show the instruments which I then employed, including the forceps described in an earlier part of this paper; and 2dly, to show that in cases of extreme fissure, extending far into or through the bones, it is generally sufficient to operate for the restoration of the soft palate and the back part only of the hard palate, leaving the anterior extremity of the fissure to be covered by a palatine plate, such as is ordinarily used in mounting artificial teeth.

In October, 1863, I published in the *American Journal of the Medical Sciences* a short *résumé* of my recent views and practice in cases of cleft palate, in which I alluded to four cases which I had chanced to see within a day or two of each other and of the date of writing. In that article I attempted mainly to show the importance of restoring the velum and posterior portion of the hard palate as nearly as possible to the normal condition of the parts, leaving it, in extreme cases, to the judgment of the surgeon and the feelings of the patient to determine whether to attempt to close the whole fissure in the bones by an operation, or to employ mechanical means to cover the front part of it. That the former course is perfectly practicable, even in very bad fissures, my earlier published cases abundantly prove, although of late years my judgment has become more and more decided against its necessity in the majority of cases which apply to the surgeon for relief.

APPENDIX.

CASE OF FISSURE OF THE HARD AND SOFT PALATE, WITH MEDIAN FISSURE OF THE ALVEOLAR ARCH, AND DOUBLE HARELIP.

I take this opportunity to put on record a very remarkable, and, as I believe, hitherto undescribed malformation, viz., a double harelip complicated with *median fissure of the alveolar arch* and of the hard and soft palate. The patient was a young man, seventeen years of age, upon whom a very dextrous and perfect operation for double harelip had been performed in infancy by my friend Professor Willard Parker, of New York. At this time, as Professor Parker has kindly informed me, he removed from the extremity of the vomer a small osseous tubercle which formed a projection similar to that often caused by the intermaxillary bones in cases of double harelip complicated with double fissure of the alveolar arch. I had been consulted from time to time on account of the cleft in the palate, but it was not until he had attained the age of seventeen years that he finally came to me for an operation. This was performed in the manner already described at length in this paper, with the result of perfectly re-establishing the velum and covering the posterior portion of the cleft in the bones. The operation was more difficult than usual, owing to the small size of the mouth, resulting from the previous operation on the lip and the unusual obliquity of the two ununited halves of the palatine vault, yet the improvement in articulation was more speedy and more decided than I remember ever to have observed in any other case. A very few weeks after the operation he was able to wear a gold plate which was made for him by Dr. Rufus E. Dixon, of this city, and it was at this time that my attention was particularly attracted to the alveolar arch and the anterior portion of the fissure. The upper lip was so closely applied to the teeth in front as wholly to conceal them, except when lifted with the fingers. A glance at this part of the mouth revealed a remarkable deviation from the ordinary condition of the jaw in this deformity, inasmuch as it showed the existence of a perfectly symmetrical median fissure extending completely through the alveolar arch, between the central incisor teeth. Upon the right side of the cleft were seen the first and second permanent incisors; then the canine tooth, out of line, and placed rather above and in front of its normal position;

then the two bicuspid; and lastly the two molars. In front of and above the right lateral incisor was the corresponding milk-tooth, hanging quite loose in the gum. Precisely the same number of teeth existed on the left side of the cleft, even to the presence of the lateral incisor of the temporary set. The central milk incisors had also formerly existed, one upon each side of the fissure, but had been removed a few years before, on account of a tendency to cross each other and press against the lip. At my request, Dr. Dixon removed the two remaining milk-teeth, and also the right central incisor of the permanent set, which seemed disposed to take an awkward position as regarded both the lip and the jaw. A cast of the mouth has been preserved and figured, showing the position of the fissure and the arrangement of the teeth.

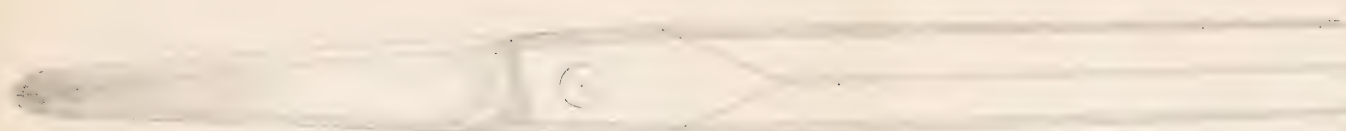


Fig. 2.

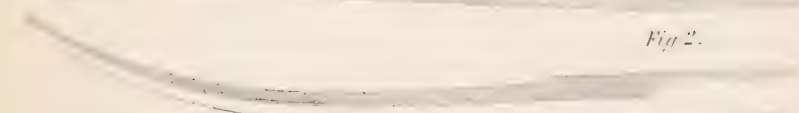


Fig. 2''.

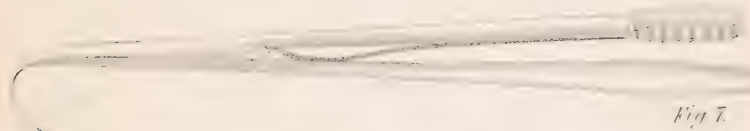


Fig. 7.



Fig. 6.

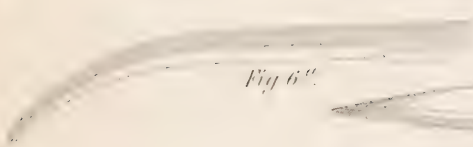


Fig. 6''.



Fig. 3.

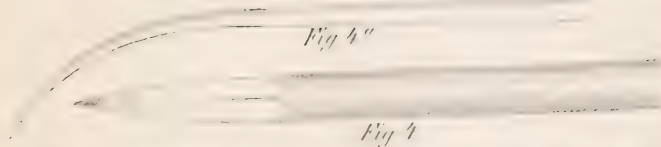


Fig. 4.

Fig. 4''.



Fig. 5.

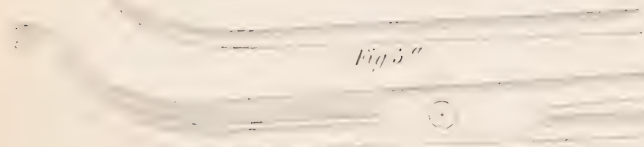


Fig. 5''.



Fig. 1''.



Fig. 1.

DESCRIPTION OF PLATE I.

INSTRUMENTS EMPLOYED IN OPERATIONS FOR CLEFT PALATE.

Figs. 1 and 1a. Forceps for seizing and holding the edge of the fissured velum.

They are in pairs, one for each side of the fissure. Fig. 1 being for the left side, and Fig. 1a for the right.

Fig. 2. Strong French scissors curved on the flat side, shown in profile in Fig. 2a; used for dividing the posterior pillar and other resisting bands, and for paring the edges of the fissure.

Fig. 3. Slender spear-pointed knife which I have sometimes used to pare the edges of the fissure.

Fig. 4. Curved spear-pointed knife, shown in profile in Fig. 4a, which I originally employed in separating the membranes from the palatine vault.

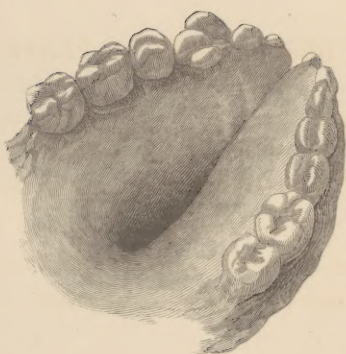
Fig. 5. A knife similar to the former, represented also in profile in Fig. 5a, but broader and shorter in its curve. This is the knife which I have used, for the last ten or fifteen years, in commencing the dissection of the covering of the hard palate.

Fig. 6. Curved scissors, smaller than those shown in Fig. 1, and with points nearly sharp; used in completing the dissection of the membranes from the bony palatine vault. Shown in profile in Fig. 6a.

Fig. 7. Crochet-aiguille of Schwerdt, represented as closed and with a thread in its eye. By pressing upon the lever the eye is opened and the thread disengaged.

DESCRIPTION OF PLATE II.

Plate II. shows the state of the parts in the case of median fissure reported in the Appendix. Being taken from a cast made after the operation, it shows the restoration of the posterior part of the hard palate, together with the velum; it serves also to give a general idea of the extent to which I now aim to close extensive fissures in the bony arch.



Dr. J. Mason Warren's case of median fissure of the palate and alveolar arch. (Drawn from a cast of the mouth taken after the restoration of the velum and posterior part of the hard palate by an operation.)

